AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

CLAIMS

1. (original) A method for adjusting resistance of an electrical component made of a thermally mutable material and temperature coefficient of change of said resistance, said thermally mutable material possessing a hysteresis characteristic with respect to a dependence of said temperature coefficient on said resistance, the method comprising:

selecting a target resistance value;

selecting a target temperature coefficient independent from said target resistance value and within a range of temperature coefficient values available for said target resistance value;

trimming said resistance value until said resistance value is substantially equal to said target resistance value; and

trimming said temperature coefficient until said temperature coefficient is substantially equal to said target temperature coefficient, while maintaining said resistance value substantially equal to said target resistance value by cycling said resistance value away from and back towards a starting point, thereby using said hysteresis characteristic of said thermally mutable material.

2. (original) A method as claimed in claim 1, wherein said trimming said resistance comprises applying a heating cycle, and said heating cycle comprises a sequence of heat pulses to trim said resistance value in a first direction and a sequence of heat pulses to trim said resistance value in an opposite direction.

3. (original) A method as claimed in any one of claims 1 and 2, wherein said trimming said temperature coefficient comprises selecting parameters of said heating cycle to determine a direction of trimming and an amount of trimming of said temperature coefficient.

4. (original) A method as claimed in claim 3, wherein said selecting parameters comprises selecting a first heat pulse of said sequence of heat pulses of said heating cycle to be of a given amplitude to determine a change in said temperature coefficient.

5. (currently amended) A method as claimed in ~~any one of~~ claims ~~3 to 4~~, wherein said electrical component is a resistor.

6. (currently amended) A method as claimed in ~~any one of~~ claims ~~3 to 5~~, wherein said electrical component is on a thermally isolated micro-platform on a substrate.

7. (original) A method as claimed in claim 6, wherein a resistive heating element is provided for generating said sequence of heat pulses.

8. (original) A method as claimed in claim 7, wherein said heating element is on said thermally isolated micro-platform.

9. (original) A method as claimed in claim 4, wherein said trimming said temperature coefficient comprises driving said temperature coefficient down by using a first pulse above a temperature coefficient reversal threshold, and driving said temperature coefficient up using pulses below said threshold.

10. (currently amended) A method as claimed in ~~any one of~~ claims ~~2 to 9~~, wherein said trimming said temperature coefficient comprises applying a plurality of heating cycles.

11. (currently amended) A method as claimed in ~~any one of~~ claims ~~9 to 10~~, wherein said electrical component is on a thermally isolated micro-platform.

12. (currently amended) A method as claimed in ~~any one of~~ claims ~~1 to 11~~, wherein said resistance and said temperature coefficient can be measured at room temperature before applying a succeeding heat pulse.

13. (original) A method as claimed in claim 12, wherein said temperature coefficient is measured during a cooling of said component with respect to an arbitrary scale, and said target temperature coefficient is substantially zero.

14. (original) A method as claimed in claim 12, wherein said target temperature coefficient corresponds to a non-zero relative temperature coefficient.

15. (original) A method as claimed in claim 4, wherein said trimming said resistance comprises providing at least one pulse just above a trimming temperature threshold to precision-trim said resistance while obtaining a negligible change in said temperature coefficient.

16. (currently amended) A method as claimed in ~~any one of~~ claims ~~1 to 15~~, wherein said component is part of a bridge circuit and said trimming said resistance creates a balanced state of said bridge circuit.

17. (original) A method for providing a circuit, the method comprising:

designing said circuit including at least one thermally-mutable component having a target resistance value and a target temperature coefficient of resistance value independent from said target resistance value, the thermally-mutable component being made of a material possessing a hysteresis characteristic with respect to a dependence of said temperature coefficient on said resistance;

identifying a nominal resistance value having a trimmable range for said resistance including said target resistance value and a trimmable range for said temperature coefficient of resistance including said target temperature coefficient of resistance;

specifying physical parameters for said component to obtain said trimmable range for said resistance and said trimmable range for said temperature coefficient; and

manufacturing said circuit on a substrate wherein said component has said nominal resistance value.

18. (original) A method as claimed in claim 17, further comprising:

trimming said nominal resistance value to be substantially equal to said target resistance value; and

trimming said temperature coefficient of resistance to be substantially equal to said target temperature coefficient of resistance value.

19. (original) A method as claimed in claim 18, wherein said specifying physical parameters comprises specifying a position of said component in said circuit and dimensions of said component.

20. (original) A method as claimed in claim 18, wherein said trimming said nominal resistance comprises applying a heating cycle, and said heating cycle comprises a sequence of heat pulses to trim said resistance value in a first direction and a sequence of heat pulses to trim said resistance value in an opposite direction.

21. (currently amended) A method as claimed in ~~any one of~~ claims ~~18 to 20~~, wherein said trimming said nominal temperature coefficient comprises selecting parameters of said heating cycle to determine a direction of trimming and an amount of trimming.

22. (original) A method as claimed in claim 21, wherein said selecting parameters comprises selecting a first heat pulse of said sequence of heat pulses of said heating cycle to be of a given amplitude to determine a change in said temperature coefficient.

23. (currently amended) A method as claimed in ~~any one of~~ claims 21 ~~to 22~~, wherein said electrical component is a resistor.

24. (currently amended) A method as claimed in ~~any one of~~ claims 21 ~~to 23~~, wherein said electrical component is on a thermally isolated micro-platform on a substrate.

25. (original) A method as claimed in claim 24, wherein a resistive heating element is provided for generating said sequence of heat pulses.

26. (original) A method as claimed in claim 25, wherein said heating element is on said thermally isolated micro-platform.

27. (original) A method as claimed in claim 22, wherein said trimming said temperature coefficient comprises driving said temperature coefficient down by using a first pulse above a temperature coefficient reversal threshold, and driving said temperature coefficient up using pulses below said threshold.

28. (currently amended) A method as claimed in ~~any one of~~ claims 20 ~~to 27~~, wherein said trimming said temperature coefficient comprises applying a plurality of heating cycles.

29. (currently amended) A method as claimed in ~~any one of~~ claims 20 ~~to 28~~, wherein said electrical component is on a thermally isolated micro-platform and wherein said resistance and said temperature coefficient can be measured at room temperature before applying a succeeding heat pulse.

30. (original) A method as claimed in claim 29, wherein said temperature coefficient is measured during a cooling of said component with respect to an arbitrary scale, and said target temperature coefficient is substantially zero.

31. (original) A method as claimed in claim 20, wherein said trimming said resistance comprises providing at least one pulse just above a trimming temperature threshold precision-trim said resistance while obtaining a negligible change in said temperature coefficient.

32. (currently amended) A method as claimed in ~~any one of~~ claims 17 ~~to 31~~, wherein said component is part of a bridge circuit and said trimming said resistance creates a balanced state of said bridge circuit.

33. (original) An apparatus for trimming a temperature coefficient of resistance of an electrical component made from a thermally mutable material possessing a hysteresis characteristic with respect to a dependence of said temperature coefficient on said resistance, the apparatus comprising:

a substrate having a portion for thermally-isolating said electrical component;

heating circuitry having a decision-making module adapted to apply heating cycles to said component, each of said heating cycles comprising a sequence of heat pulses to trim a resistance value in a first direction and a sequence of heat pulses to trim said resistance value in an opposite direction, and wherein each heating cycle trims said temperature coefficient of resistance by an increment by cycling said resistance value away from and back towards a starting point, thereby using said hysteresis characteristic of said thermally mutable material; and

measuring circuitry adapted to measure said resistance and said temperature coefficient of resistance.

34. (original) An apparatus as claimed in claim 33, wherein said decision-making module is adapted to determine an amplitude of a heat pulse, a duration of said heat

pulse, and a time interval before a succeeding heat pulse.

35. (currently amended) An apparatus as claimed in ~~any one of~~ claims 33 ~~to 34~~, wherein said heating circuitry comprises a heating element for heating said electrical component.

36. (currently amended) An apparatus as claimed in ~~any one of~~ claims 33 ~~to 35~~, wherein said electrical component is a resistor.

37. (currently amended) An apparatus as claimed in ~~any one of~~ claims 33 ~~to 36~~, wherein said substrate has a thermally-isolated micro-platform for said electrical component.

38. (original) An apparatus as claimed in claim 37, wherein said heating element is on said thermally isolated micro-platform.

39. (original) An apparatus as claimed in claim 37, wherein said heating element is on a second thermally isolated micro-platform in close proximity to said electrical component.

40. (currently amended) An apparatus as claimed in ~~any one of~~ claims 33 ~~to 39~~, wherein said decision-making module determines said amplitude of a heat pulse, duration of said heat pulse, and time interval before a succeeding heat pulse as a function of a history of pulses applied to said electrical component.

41. (currently amended) An apparatus as claimed in ~~any one of~~ claims 33 ~~to 40~~, wherein said component is part of a bridge circuit, and said apparatus is for adjusting said temperature coefficient of a bridge output.

42. (currently amended) An apparatus as claimed in ~~any one of~~ claims ~~33 to 41~~, wherein said heating circuitry generates said heating cycle for trimming said temperature coefficient.

43. (original) An apparatus as claimed in claim 42, wherein said heating cycle comprises a sequence of pulses to trim said resistance in a first direction and a sequence of pulses to trim said resistance in an opposite direction.

44. (original) An apparatus as claimed in claim 43, wherein said decision-making module determines an amplitude of a first pulse of said sequence of pulses to determine a direction and an amount to trim of said temperature coefficient.

45. (original) An apparatus as claimed in claim 33, wherein said electrical component is a first resistor and it resides on a first thermally-isolated micro-platform, and further comprising a second resistor made from a thermally-mutable material and residing on a second thermally-isolated micro-platform; wherein said heating circuitry comprises a first resistive heating element on said first thermally-isolated micro-platform and a second resistive heating element on said second thermally-isolated micro-platform; and wherein said measuring circuitry comprises a central resistive heating element placed on a third thermally-isolated micro-platform substantially symmetrically between said first resistor and said second resistor such that heating through said central resistive element results in a substantially symmetric temperature rise in said first resistor and said second resistor.

46. (original) An apparatus as claimed in claim 45, further comprising two additional resistors connected to said first resistor and said second resistor, such that a Wheatstone bridge is formed.

47. (currently amended) An apparatus as claimed in ~~any one of~~ claims ~~45 and 46~~, wherein said thermally mutable material is polysilicon.

48. (currently amended) An apparatus as claimed in ~~any one of~~ claims ~~45 to 47~~, wherein said central resistive element is made of polysilicon.

49. (currently amended) An apparatus as claimed in ~~any one of~~ claims ~~45 to 48~~, wherein said measuring circuitry and said calculating circuitry are on a same chip as said substrate.

50. (original) A method for trimming a temperature coefficient of resistance of at least one electrical component made from a thermally mutable material possessing a hysteresis characteristic with respect to a dependence of said temperature coefficient on said resistance, while maintaining a substantially constant resistance value, the method comprising applying a heating cycle to trim said resistance value away from a target resistance value and back to said target resistance value, wherein the temperature coefficient of resistance is modified after applying said heating cycle by cycling said resistance value away from and back towards a starting point, thereby using said hysteresis characteristic of said thermally mutable material.

51. (original) A method as claimed in claim 50, wherein applying the heating cycle comprises using a first set of pulses to trim away from said target resistance value and pulses of amplitudes lower than said first set of pulses to trim back to said target resistance value.

52. (original) A method as claimed in claim 51, wherein said heating cycle comprises at least one heating pulse having a first amplitude, followed by a plurality of heating pulses having amplitudes lower than said first amplitude.

53. (original) A method as claimed in claim 52, wherein said plurality of heating pulses have varying amplitudes.

54. (original) A method as claimed in claim 53, wherein each of said plurality of heating pulses has an amplitude equal to or lower than an amplitude of a previous pulse.

55. (currently amended) A method as claimed in ~~any one of~~ claims 50 ~~to 54~~, further comprising applying a second heating cycle to continue trimming said temperature coefficient of resistance.

56. (original) A method as claimed in claim 55, wherein said second heating cycle comprises a first pulse of equal or greater amplitude than a first pulse of a previous heating cycle.

57. (currently amended) A method as claimed in ~~any one of~~ claims 50 ~~to 56~~, further comprising applying a plurality of subsequent heating cycles to further trim said temperature coefficient of resistance to a target temperature coefficient of resistance.

58. (original) A method as claimed in claim 57, wherein said applying a plurality of subsequent heating cycles comprises trimming said temperature coefficient of resistance below said target temperature coefficient of resistance and gradually increasing said temperature coefficient of resistance to said target temperature coefficient of resistance.

59. (currently amended) A method as claimed in ~~any one of~~ claims 50 ~~to 58~~, wherein said electrical component is a resistor.

60. (currently amended) A method as claimed in ~~any one of~~ claims 50 ~~to 59~~, wherein said electrical component is on a thermally isolated micro-platform on a substrate.

61. (original) A method as claimed in claim 60, wherein a resistive heating element is provided for generating said heating cycle.

62. (original) A method as claimed in claim 61, wherein said heating element is on said thermally isolated micro-platform.

63. (currently amended) A method as claimed in ~~any one of~~ claims 50 ~~to 62~~, wherein said at least one electrical component is a pair of matched resistors, and said temperature coefficient of resistance is a relative temperature coefficient of resistance.

64. (original) A circuit comprising at least one electrical component made of a thermally mutable material possessing a hysteresis characteristic with respect to a dependence of said temperature coefficient on said resistance, defined by an upper limit and a lower limit of resistance, and having a temperature coefficient of resistance; characterized in that said resistance is set to a predetermined target resistance value and said temperature coefficient of resistance is set to a predetermined target temperature coefficient of resistance value independent of said target resistance value.

65. (cancelled)

65. (currently amended) A circuit as claimed in ~~any one of~~ claims ~~64 to 65~~, wherein said predetermined target resistance value and said predetermined target temperature coefficient of resistance are set to respect an overall predetermined circuit state.

66. (currently amended) A circuit as claimed in ~~any one of~~ claims ~~64 to 66~~, wherein said at least one component comprises at least two components having a substantially matched resistance value, and wherein said predetermined temperature coefficient of resistance value is a relative temperature coefficient of resistance between said at least two components.

67. (currently amended) A circuit as claimed in claim 66, wherein said substantially

matched resistance value of said two components has a tolerance value no greater than 50 ppm.

689. (currently amended) A circuit as claimed in claim 667, wherein said substantially matched resistance value of said two components has a tolerance value no greater than 200 ppm.

6970. (currently amended) A circuit as claimed in ~~any one of~~ claims 667 ~~to 69~~, wherein said relative temperature coefficient of resistance of said two components has a tolerance value no greater than 50 ppm/K.

701. (currently amended) A circuit as claimed in ~~any one of~~ claims 676 ~~to 69~~, wherein said relative temperature coefficient of resistance of said two components has a tolerance value no greater than 10 ppm/K.

712. (currently amended) A circuit as claimed in ~~any one of~~ claims 667 ~~to 71~~, wherein said relative temperature coefficient of resistance of said two components is less than 3% of an as-manufactured temperature coefficient of resistance value of one of the two components.

723. (currently amended) A circuit as claimed in ~~any one of~~ claims ~~64 to 66~~, wherein said at least one component comprises at least two components and said target resistance value is a ratio between said at least two components, and wherein said matched resistance value of said at least two components has a tolerance value no greater than 200 ppm of said ratio.

734. (currently amended) A circuit as claimed in ~~any one of~~ claims ~~64 to 73~~, wherein said at least one component comprises at least two components and said predetermined temperature coefficient of resistance value is a relative temperature coefficient of resistance between said at least two components, and said relative

temperature coefficient of resistance of said at least two components is a desired non-zero relative difference from each other, and has a tolerance value no greater than 10ppm/K.

745. (currently amended) A circuit as claimed in ~~any one of~~ claims ~~64 to 74~~, wherein said circuit is one of a balanced bridge circuit, a calibrated amplifier, and a calibrated sensor system.

756. (currently amended) A circuit as claimed in ~~any one of~~ claims ~~67 to 75~~, wherein said at least two components are a pair of resistors connected in series, and wherein said target temperature coefficient of resistance is a relative temperature coefficient equal to substantially zero.

767. (currently amended) A circuit as claimed in ~~any one of~~ claims ~~64 to 76~~, wherein said at least one component is a resistor.

778. (currently amended) A circuit as claimed in ~~any one of~~ claims ~~64 to 77~~, wherein said at least one component is on at least one thermally-isolated micro-platform.

789. (currently amended) A circuit as claimed in claim 778, further comprising a heating element on said at least one thermally-isolated micro-platform.

7980. (currently amended) A circuit as claimed in claim 789, further comprising a second thermally-isolated micro-platform having a second electrical component made from a thermally mutable material and a second heating element.

8081. (currently amended) A circuit as claimed in claim 7980, further comprising a central resistive heating element on a third thermally-isolated micro-platform substantially symmetrically between said at least one electrical component and said second electrical component such that heating through said central resistive element

results in a substantially symmetric temperature rise in said at least one electrical component and said second electrical component.

8182. (currently amended) A circuit as claimed in ~~any one of~~ claims ~~64 to 81~~, wherein said at least one component is made of polysilicon.